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ABSTRACT

This article presents an overview of an ongoing initiative to develop, integrate, and evaluate multimedia lessons to enhance listening comprehension in Spanish language classes at the Catholic University of America (District of Columbia). Focusing on the process involved, the two phases of the project that have been completed are examined, including the rationale, selection of the Libra authoring system, the building of the authoring team, design and revision of the lessons, and their integration into the curriculum. Findings from the evaluation components are explored, with particular emphasis on evidence pointing to the need to understand better how learners actually interact with multimedia. Based on the lessons learned from this project, guidelines are suggested for those who may be interested in a similar undertaking. A student survey form is appended. Contains 21 references. (MSE)

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The Multiple Challenges of Multimedia: Development, Implementation, and Evaluation

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The Multiple Challenges of Multimedia: Development, Implementation, and Evaluation

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This article presents an overview of an ongoing initiative to develop, integrate, and evaluate multimedia lessons to enhance listening comprehension in Spanish language classes at The Catholic University of America. In an effort to focus on the process involved, the two phases that have been completed are examined, including the rationale for the project, the selection of the Libra authoring system, the building of the authoring team, the design and revision of the lessons, and their integration into the curriculum. Findings from the evaluation components are explored with particular emphasis on the evidence pointing to the need to understand better how learners actually interact with multimedia. Based on the lessons learned from this project, guidelines are suggested for those who may be interested in pursuing a similar undertaking.

INTRODUCTION

In the second language teaching field today, there is great interest in technology and its potential to enhance second language learning. Multimedia has a particular appeal, due in part to what Pusack and Otto (1997) refer to as its "capacity to access and control via computer a full range of familiar media: text, motion video, photo images, sound and graphics" (p. 2). Many of the materials teachers have previously used effectively to promote language learning can be placed at the learners' fingertips in the digital environment with the promise of increased learning outcomes. The allure of multimedia must be tempered, however, with the realities that confront any instructional innovation: the challenges of development, implementation, and evaluation. How does one go about developing multimedia lessons for use in multiple-section courses? How can these lessons be integrated in the existing curriculum? How can multimedia be evaluated? These fundamental questions will be examined in the context of a multimedia project for beginning level Spanish undertaken at The Catholic University of America (CUA).

BACKGROUND OF THE PROJECT

The Department of Modern Languages at CUA was interested in exploring language learning technology, particularly as a way to enhance students' out-of-class language learning. This option had become feasible due to our recently installed Multimedia Language Center, a small, independent study room equipped with computers, VCRs, laserdisc, etc. As a first step, the media director and language coordinator attended a workshop on Libra, a multimedia authoring system designed to facilitate listening comprehension. Libra was developed by Robert Fischer and Mike Farris at Southwest Texas State University at San Marcos [1] with the support of the Fund for the Improvement of Post-Secondary Education (FIPSE). Because the listening comprehen-

sion goals of CUA's Spanish program *Destinos* were compatible with those of Libra, the team applied for and received a grant to develop, implement, and evaluate Libra lessons for *Destinos* as a part of Fischer's FIPSE project.

LISTENING COMPREHENSION AND TECHNOLOGY

A focus on listening comprehension at the novice and intermediate levels is well supported by research and theoretical models that point to comprehensible input and intake as fundamental to second language acquisition. As Rubin (1994) noted in her review of the relevant literature, the actual process of listening has received considerable research attention. Comprehension has come to be seen as a dynamic, interactive, cognitive process in which listeners construct mental representations of their understanding of texts, using and coordinating both concept-driven (top-down) and sentence and word-level (bottom-up) processes. Furthermore, in real-world, face-to-face communication, listeners have immediate access to information about the context of their interactions (participants and setting) and paralinguistic cues (such as eye movement and gestures), and they generally have some control of the interaction by means of negotiation and use of strategies (Joiner, 1997).

Given this understanding of the listening process, how can technology best be brought to bear on listening skill development? While traditional cassettes provide the audio component and video the visual information, these media do not facilitate the interaction of learners with the text other than through their cumbersome replay option. Multimedia, however, because of its digital nature, allows direct access to and manipulation of particular segments of text and, by means of various help features, offers the user added options for managing the interaction. As Joiner (1997) notes,

> Computer-assisted multimedia comes closer than the other audio and visual media to meeting the standard for listening embodied in face-to-face communication. Presence, interactivity, control, multisensory input, and multiple sources of assistance can be incorporated into this sophisticated technology. (p. 90)

LIBRA AUTHORING SYSTEM

Libra is a hypercard-type program for Macintosh [2] that allows the teacher to create a stack of question cards written to target selected segments of a videotext. These question cards appear on the computer screen and are linked to video clips that have either been digitized and are accessible on the same screen or that are shown on a laserdisc player, as was the case in this study. The Libra documentation recommends beginning each lesson with a textmap to acquaint learners graphically with the structure of the text. These advance organizers may reappear before each segment to lead users from one segment to another logically (see Figure 1). The five question templates available in the program are flexible and may be used to focus learners' attention on various aspects of listening comprehension,

from main ideas to details and specific words. For multiple choice, checklist, binary checklist, and icon sorting questions (see Figures 2, 3, 4, and 5), learners select the correct responses by clicking or dragging and get immediate feedback. The fifth question type is open-ended and allows users to create their own answers by typing into a notebook. While the teacher sets parameters by deciding which portion of the video is available on a given card, learners are given considerable control of their learning: they may rewind, replay, and fast-forward as needed, and they may access a number of help features such as a dictionary, a list of characters, a story summary, script, and special notes.

THE PROJECT

The multimedia project at CUA has gone through two phases, each of which involved developing, implementing, and evaluating lessons.

Phase 1: Development and Implementation

In the initial pilot study in the spring of 1995, the language coordinator/media director team and a

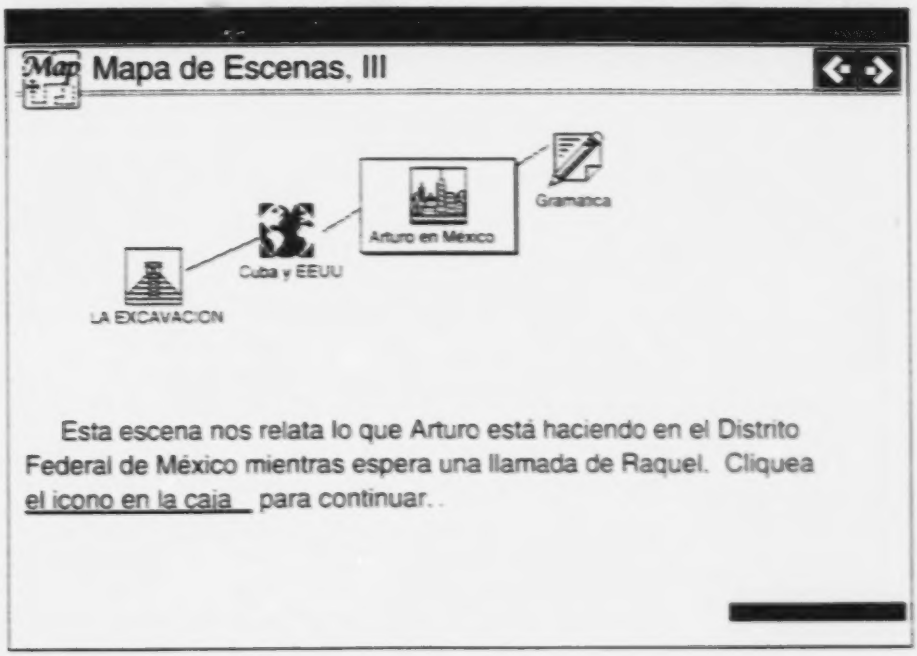
Mapa de Escenas, III
Gramatica
Arturo en México
Cuba y EEUU
LA EXCAVACION
Esta escena nos relata lo que Arturo está haciendo en el Distrito Federal de México mientras espera una llamada de Raquel. Cliquea el icono en la caja para continuar.

Figure 1. Advance Organizer

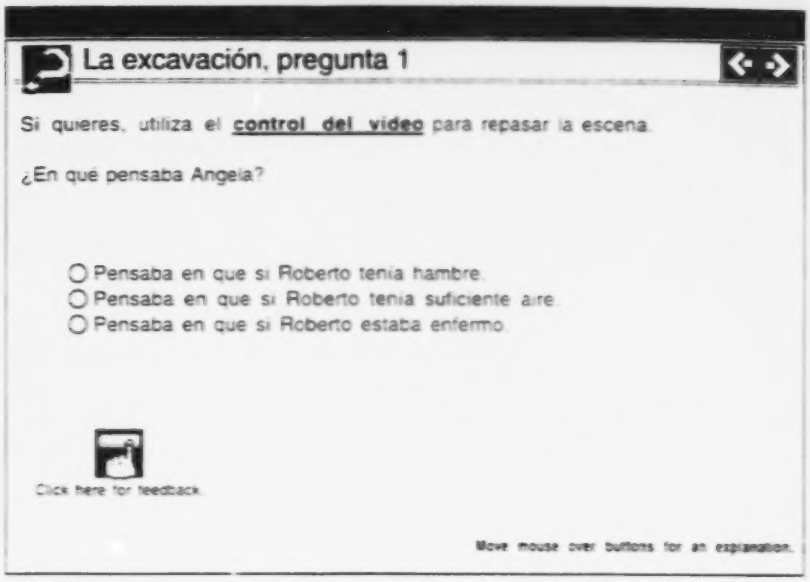
La excavación, pregunta 1
Si quieres, utiliza el control del video para repasar la escena.
¿En qué pensaba Angela?
Pensaba en que si Roberto tenía hambre.
Pensaba en que si Roberto tenía suficiente aire.
Pensaba en que si Roberto estaba enfermo.
Click here for feedback.
Move mouse over buttons for an explanation.

Figure 2. Multiple Choice Questions

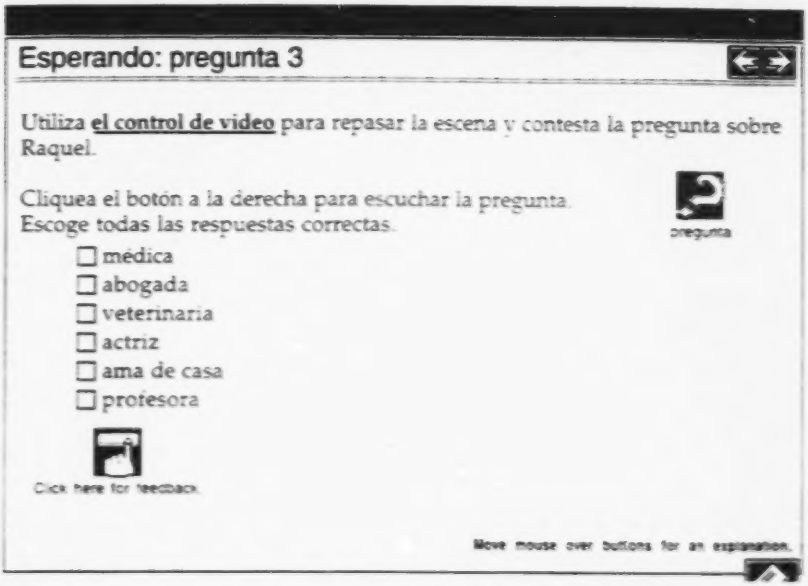
Esperando: pregunta 3
Utiliza el control de video para repasar la escena y contesta la pregunta sobre Raquel.
Cliquea el botón a la derecha para escuchar la pregunta.
Escoge todas las respuestas correctas.
pregunta
médica
abogada
veterinaria
actriz
ama de casa
profesora
Click here for feedback.
Move mouse over buttons for an explanation.

Figure 3. Checklist Questions

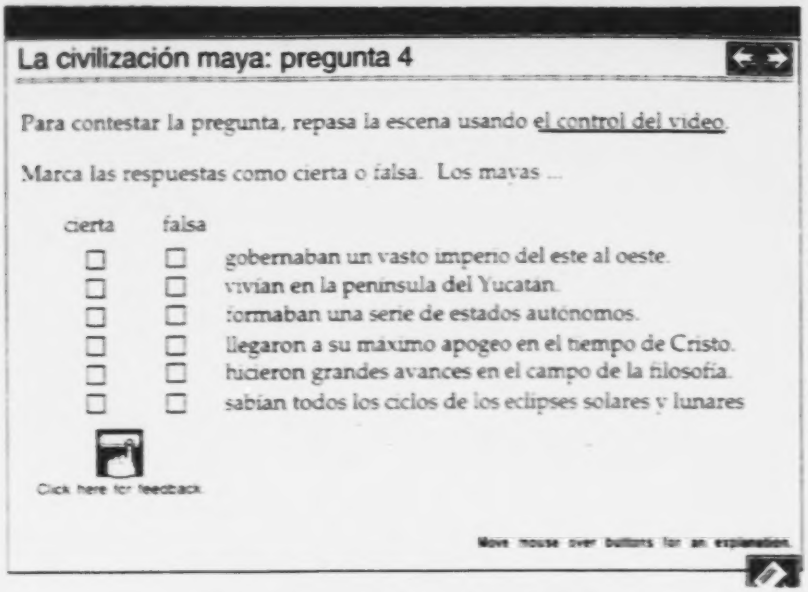
La civilización maya: pregunta 4
Para contestar la pregunta, repasa la escena usando el control del video.
Marca las respuestas como cierta o falsa. Los mayas ...
cierta
falsa
gobernaban un vasto imperio del este al oeste.
vivían en la península del Yucatán.
formaban una serie de estados autónomos.
llegaron a su máximo apogeo en el tiempo de Cristo.
hicieron grandes avances en el campo de la filosofía.
sabían todos los ciclos de los eclipses solares y lunares
Click here for feedback.
Move mouse over buttons for an explanation.

Figure 4. Binary Checklist Questions

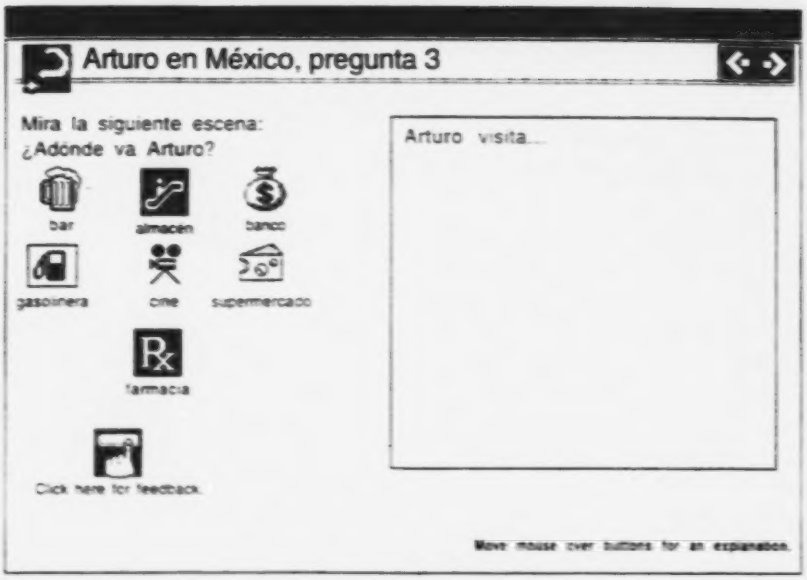

Figure 5. Icon Sorting Questions

graduate teaching assistant (TA) designed Libra lessons of approximately 20 cards each to accompany eight *Destinos* episodes used in second- and third-semester Spanish. The 25-minute episodes were segmented into scenes, and text maps led the learners to view each scene in its entirety without stopping. Subsequent cards asked questions on both main ideas and details in the scene and provided learners the opportunity to review relevant portions of the scene as needed. Due to time limitations, no glossary was provided, and scripts and character lists were not available for all lessons.

At the second-semester level, two instructors of four class sections with a total of 59 students participated in Phase 1. The third-semester group involved three instructors of six sections with 106 students. For each lesson, students had one week to go to the Multimedia Language Center individually or with a partner to complete the assignment. They either completed the Libra lesson linked with the *Destinos* videodisc in the experimental group, or they viewed the video and filled in a written worksheet in the control group. The questions in both conditions were substantially the same, though some of the written questions had to be adapted from electronic to print medium. The instructors were requested not to discuss the episode until the day it was to be completed.

Because the episodes assigned for out-of-class work were an integral part of the *Destinos* program, the project team felt that they would integrate smoothly into the classwork just as the other videos viewed in the lab did. To reinforce the notion that these assignments were indeed required, the syllabus listed their due dates, and the course description stated that they counted as 10% of the final course grade.

Phase 1: Evaluation

The evaluation of the pilot study was based on a time-series experimental design in which the students alternated between the experimental Libra condition and the control group. A modified recall protocol pretest served to establish preexisting differences among the students. Similar recall protocols in English, collected in class the day students were to have completed viewing the assigned episode, served as the posttest. Due primarily to an uncooperative instructor, the second-semester data were quite incomplete and yielded no statistically significant results. The third-semester data were reduced by student absences, but complete data sets were available on 17 students in the experimental group and 20 in the control group. An analysis of covariance revealed that on two of the four posttests, the experimental group significantly outperformed the control group. A third posttest approached significance (see FIPSE, 1994, for complete data and explanation). Thus, despite the limited data, the pilot study provided evidence of the positive impact that the Libra-based viewing of the *Destinos* videos had on comprehension.

Student questionnaires administered at the end of the semester

complemented the quantitative analysis. These questionnaires revealed a generally positive attitude toward the multimedia lessons (see Table 1). The areas of concern identified by the student users included the length of time required to complete the lessons and the lack of understanding of the program on the part of some of the instructors, students, and lab attendants. In its own evaluation of the project, the development team posited two additional factors that may have contributed to the lack of regular student participation: insufficient integration into classwork and the redundancy built into the *Destinos* program, which, appropriately for a soap opera, allows viewers to follow the story line even if they miss an episode.

Phase 2: Development and Implementation

The second phase of the project focused on addressing the concerns raised in the pilot and on improving participation. The Phase 1 authoring team and two additional TAs reconfigured four of the lessons for second-semester Spanish (see sample cards in Figures 2 to 5). With the continued support of the FIPSE project, one of the TAs had received a grant to attend a Libra workshop, and he then helped teach the authoring system to the other TA team member as they rewrote the lessons.

Two major changes were incorporated into the lesson revisions. First, given the redundant nature of the videos, the team reduced the

Table 1
Attitude Questionnaire Item from Phase 1 (n=80)

My attitude toward using computers to learn a foreign language:

	Before This Semester	After This Semester
Hostile	1	2
Hesitant	13	14
Indifferent	30	22
Curious	31	21
Enthusiastic	5	21

amount of video to be viewed in each lesson to three to four segments: one or two that presented the key story line events, one that focused on culture, and one that targeted functional language use. Second, several adjustments were made to the lessons to allow the learner greater flexibility in interacting with the text. A video control panel was added to every card so students could fast-forward, rewind, and replay as needed at any time. More help features, in the form of scripts, character lists, and a glossary, were provided in three of the four lessons. A third change involved the addition of video-related grammar exercises, but because this component was not included in the pilot study, it will not be examined in this article.

Significant changes were made in the implementation of the revised lessons. The two second-semester Spanish instructors were closely involved in the development of the lessons, and, as a result of their investment in the process, they understood Libra clearly and were able to explain it adequately to their students. The instructor team made a conscious effort to integrate the viewings more tightly with coursework. They agreed to hold detailed discussions of the targeted scenes in class, to give brief dictations and quizzes on them, and to incorporate them directly into exam questions. Care was also taken to train the lab assistants more thoroughly on the program.

During the spring semester of 1997, the 55 students enrolled in the four sections of second-semester Spanish taught by the two TAs who helped revise the Libra lessons participated in Phase 2 of the project. As requested by the students in the pilot study and recommended by Masters-Wicks et al. (1996), an orientation to the program was held in class before the first lesson was assigned. Using transparencies of sample computer screens, the instructors explained the question types and the general navigation features. As before, the lessons represented 10% of the final grade, and due dates were listed on the syllabus.

The final evaluation, which was qualitative in nature, was done via a user questionnaire (see the appendix). The questionnaire included Likert-scale items to assess student reactions and open-ended questions to gain more insight into the students' own perceptions of the lessons. Instead of waiting until the end of the semester to assess students' views, the students completed the Phase 2 questionnaire in the Multimedia Language Center following completion of the last lesson. It was hoped that, by answering the questions immediately after the lesson, learners would provide more accurate information because their experiences would be fresh in their minds.

Phase 2: Evaluation Results and Discussion

A total of 30 students out of the 55 enrolled completed the questionnaire. The instructors were surprised at this low response rate because more than 30 students reported doing the Libra lessons. Some students may have done all the lessons except the final one when the questionnaire was distributed. Perhaps the

lab attendants were not diligent enough in handing out and collecting the questionnaires as students completed the lesson. While the causes cannot be determined with certainty, the 55% response rate is evidence of the difficulty of investigating a phenomenon that is essentially an out-of-class, independent activity.

The four Likert-scale questions are presented in Table 2. The responses to Questions 1 and 2 suggest that this second phase more successfully provided the support learners needed to feel comfortable using the computer materials. The third and fourth questions again reflect a generally positive (though not enthusiastic) attitude toward computer-mediated learning: fewer students were negative at the end of the project than at the beginning.

The following five open-ended questions composed the second part of the survey:

1. What was the main benefit you derived from doing the Libra computer lessons?
2. What strategies did you use to maximize this benefit?
3. What did you like the most about doing the Libra computer lessons?
4. If you could improve one aspect of the Libra computer lesson, what would it be?

Table 2
Likert-Scale Questionnaire Items from Phase 2 (n=30)

	SA	A	N	D	SD
1. I had sufficient orientation to the *Libra* program before doing the lessons on my own.	10	9	3	6	1
2. The lab attendants are helpful to me when I use the multimedia program.	8	13	5	2	0
3. At the beginning of the semester, my attitude toward using computers to learn a foreign language was positive.	8	8	10	4	0
4. After the completing the *Libra* computer lessons, my attitude toward using computers to learn a foreign language is positive.	8	13	8	1	0

SA = Strongly Agree, A=Agree, N=No Opinion, D=Disagree, SD=Strongly Disagree

5. In your opinion, what would be the ideal number of Libra computer lessons to do [per semester]? How much time would you be willing to spend on each?

While there was considerable variation in the wording of individual student responses, the answers to these questions were revealing, in particular when considering the patterns that emerged across student comments. Tables 3, 4, and 5 summarize the responses to the first three questions, including the category or pattern of response, the number of students who made comments with that focus, and some sample comments.

When questioned about their perceptions of the benefits of the Libra lessons (see Table 3 for summary), half of the students (14) expressed the view that the lessons helped them "hear" or "understand" the videos. This response is in line with the listening comprehension goals of the authoring system itself and our own programmatic objectives and provides encouraging evidence of Libra's face validity. Closely related to the comprehension focus was the observation of three students that the lessons emphasized the storyline. This awareness of main events appears to support the use of the textmap as a way to offer learners support in building the

Table 3
Questionnaire Responses, Phase 2: Student-Perceived Benefit of Multimedia Lessons (n =30)

Question 1. What was the main benefit you derived from doing the Libra computer lessons?

Category of Response	Number of Responses	Sample Comment
Listening comprehension	14	• To see and hear lesson at my speed • Understanding more of what was said by the characters
Focus on content	3	• Reinforced the storyline and made it more clear
Practice	3	• To watch a lesson and do exercises about it
Vocabulary	2	• I gained a larger vocabulary

macropropositional structure of the text. Additionally, three students identified practice as Libra's greatest benefit, an apparent recognition of being more actively involved than in traditional video viewing. Finally, two students specified that Libra was useful in improving their vocabulary. While no vocabulary assessment was done in this study, Chun and Plass (1996) found evidence of considerable vocabulary learning in their work with multimedia to enhance reading comprehension. Their work and student comments in this study raise questions about the possibility of incidental vocabulary learning in the Libra multimedia environment, questions that need to be addressed in future research.

The second question asked students to reflect on and identify the strategies they had used while doing the Libra lessons (see Table 4). Most frequently cited (by ten students) was the use of the rewind/replay button, with comments such as "I listened to segments more than once using review buttons." Students' willingness to interact with the computer in order to adjust for their own learning needs is an example of the positive side of learner control in multimedia.

A second strategy mentioned by three students was attending more closely to the material; as one student said, "[I] listened to it more than I pay attention to *Destinos*." Multimedia lessons written with systems such as Libra have the potential to facilitate attention in a number of ways: video is segmented and efficiently accessible, lessons are task-oriented, earphones reduce

Table 4
Questionnaire Responses, Phase 2: Strategy Use (n=30)

Question 2. What strategies did you use to maximize this benefit?

Category of Response	Number of Responses	Sample Comment
No response	12	
Replay	10	• Using the rewind button to review when confused or unsure
Attention	3	• Listened to it more than I pay attention to *Destinos*
Visuals	2	• Watching the videos themselves

sound distortion, and students physically interact with the computer via mouse clicks to progress through the lesson. Because paying attention is one of the metacognitive strategies considered essential for language learning (Oxford, 1990), this capacity may be one of multimedia's important strengths.

In a response that may be related to learning style preferences, two students claimed to attend to the videos themselves. Since the visual stimulus helps to contextualize the input, focusing on the images may be a particularly helpful strategy to visual learners. Though learning styles were not examined in this investigation, there is growing research interest in this area (Beauvois & Eledge, 1996; Chun & Plass, 1996; and Meunier, 1997). Other strategies mentioned (each by one student) included doing the lessons with a partner, reading the questions in advance, and consulting the feedback.

Perhaps most notable is what students did not say in response to this question. Twelve of the 28 students did not offer any strategies at all. Though the lack of comment does not necessarily mean that the students did not make use of any strategies, it does raise a fundamental question: Are students sufficiently aware of their learning needs in order to address them? In the traditional, teacher-mediated classroom, metacognitive strategies that enable learners to address their learning needs are essential, but they may be even more critical in the autonomous learning environment of multimedia.

As a case in point, the questionnaire results suggest that the students may not have taken full advantage of some of the help features. While 80 to 90% of the students claimed to use the replay function "sometimes" or "often," 25% of the students reported "never" using the script or glossary, 40% reported using them "sometimes," and the remainder did not respond. The uneven use of help functions may be in part due to issues such as the level of difficulty of the lesson questions, the screen design of these features, the lack of adequate training on their use, and forgetfulness on the part of the students. Though the version of Libra used in this project did not allow for tracking student actions [3], studies that examined computer logs for computer-assisted writing (Scott, 1990) and reading (Davis & Lyman-Hager, 1997) came to a similar conclusion: students did not make adequate use of the resources provided. Based on their findings with third-semester French students, Davis and Lyman-Hager suggest that "students need training to use computers in the most beneficial way" (p. 68).

What are the strategies that "good multimedia learners" use? Can or should these strategies be taught? If so, how? How is strategy use affected by proficiency level and motivation? Hoven (1997) proposes that not all second language learners, especially in the initial stages of their learning, want or are able to take control (105). She advocates a hierarchy of task types to raise students' awareness of strategies. As recommended by Pusack and Otto

(1997), "issues of control and interactivity in multimedia instruction urgently require more attention from researchers to inform development" (p. 10).

When asked what they liked best about the multimedia lessons, students responded quite pragmatically (see Table 5). Nine students indicated that the lessons helped them achieve their short-range goals ("It helped my understanding of *Destinos*") and their longer-range goals ("Improved my listening skills," "Very helpful on tests"). Five students highlighted the learner-centeredness of the lessons, for example, being able to "choose [their] own time [to do the lessons]," "partner up", and "start[ing] and stop[ping] when I need to."

The ability to check their work via the feedback button was cited as a plus by four students. In the literature, access to immediate, non-threatening feedback is widely seen as an advantage of computer-assisted learning (Bush, 1997; Pennington, 1996; Pusack & Otto, 1997). In the foreign language learning context, the research on error correction has been focused primarily on oral feedback, and results have been mixed (for a summary, see Chaudron, 1988). As yet, there is little research on the impact of computer-provided

Table 5
Questionnaire Responses, Phase 2: What Students Liked the Most About the Lessons (n =30)

Question 3. What did you like the most about doing the Libra computer lessons?

Category of Response	Number of Responses	Sample Comment
Goal-oriented	9	• Made the lesson more clear • Very helpful on tests • Improved my listening skills
Control	5	• Having the option of starting and stopping when I need to • Choose own time • Can partner up if you want
Feedback	4	• Checking your answers

feedback on language learners. How do learners react to computer feedback? Is it anxiety-producing? What types of feedback are most helpful?

In a study of feedback on computer-assisted grammar practice, Nagata and Swisher (1995) found evidence that 'smart' feedback, which gave further information about errors, was more useful to students than the generic variety. What feedback is most appropriate for comprehension-based tasks? The feedback provided in the Libra lessons was generic, offering such responses as the following: "All of the answers so far are correct. Keep going." "None of your answers are correct." "Some of your answers are correct and some are not." Despite the general nature of this feedback, 68% of the students claimed to use the feedback "sometimes" or "often," and 68% described it as "helpful" or "very helpful." There were, however, two requests for improved feedback. One student noted, "If I got it wrong, I never knew why." The lack of understanding of this potentially valuable component of the multimedia environment points clearly to a need for further research.

The final questions provided input for further cycles of development and implementation. For example, one student recommended showing the video on the same screen as the questions, a possibility with newer versions of the Libra program, but feasible only with the addition of a video server to store the lesson segments. The generally positive attitude of the students to the Libra lessons was reflected in their responses to the last question. Three students wanted to do one multimedia lesson for each of the 17 chapters studied during the semester. Others offered suggestions ranging from 3 to 6 lessons, with 5 as the median. Almost half of the students expressed a willingness to spend from 20 to 40 minutes per lesson. At the present time, the Libra lessons that were not updated in Phase 2 are currently being restructured to be 20 to 30 minutes in length.

CONCLUSION AND IMPLICATIONS

The effective use of multimedia presents challenges at many levels. For those who are interested in exploring this instructional tool, several recommendations follow from the CUA experience.

1. **Select authorware according to its theoretical foundation and your project goals.**

As the array of possibilities for authorware is growing rapidly, the selection process needs to be made with care. Authorware should be selected according to its compatibility with current language learning models and the project goals. Libra was created with comprehension theory in mind and our goals were listening comprehension. Other programs such as GALT and Annotext are designed to facilitate reading comprehension (for a summary of currently available authorware by language skill, see Martínez & Herren, 1998).

2. **Create broad support for your project.**

Due to the time, skill, and energy demands of working with multimedia, broad support is necessary.

The development team might include the language coordinator, another faculty member(s), the media director, graduate teaching assistant(s), and undergraduate assistants. Outside support from the software creator and grant project director is necessary for technical reasons and can also be valuable in building support for the project at higher levels in the university. Backing from the department chair and dean is important as release time and funds are necessary for project members to attend workshops and develop and rework lessons. This high-level support is also key when faculty submit multimedia projects as part of their activity reports and tenure and promotion reviews.

3. **Assess facilities and technical issues in advance.**

Because university facilities, academic computer support, and software requirements vary widely, it is not useful to outline specific technical guidelines. The basics of availability and compatibility of equipment and software need to be addressed, however, as do logistical considerations, such as the following: How many stations are available for how many students? Should students reserve time slots? Should they work in pairs? Are the lessons properly loaded and easily accessible on each station? Are lab assistants familiar enough with the lessons to help students as needed? Dealing with these issues will help the project run more smoothly.

4. **Familiarize instructors with the program and the project.**

Instructor preparation is crucial to the implementation process. Not only do instructors need to be familiar with how the program functions, but they also need an understanding of the rationale for the program in order to respond adequately to students' questions. It may be useful to acquaint new instructors with the history of the project and, if possible, to involve them in revising questions. In this manner, instructors will feel more a part of the lessons and will be able to offer useful suggestions for future improvements.

5. **Integrate the out-of-class work into class.**

Integrating the lessons into the coursework is a substantial challenge. Including the project on the course description and assigning it a percentage of the grade are only the beginning. Conducting student orientations helps make student users more aware of what they are expected to do and allows them to begin to establish a comfort level with the lessons. Beyond the need for these preliminary arrangements, our experience points to one key reality of the use of multimedia, especially for out-of-class work: learners interact variably with the program. Some students may do the lessons quickly with no difficulties, some may listen several times to the segments and consult numerous help features, others may begin but not finish, and others may not do the lessons at all.

Because the use of multimedia is a fragmentary experience that differs from one learner to another, spending time in class to recreate and unify the experience for the class as a whole is indispensible [4]. Thus, follow-up activities such as putting events in order, identifying characters and their roles, and summarizing, as well as providing traditional matching and dictation quizzes, need to be incorporated. Exams can also include questions that focus on the lesson segments.

6. Include evaluation.

Evaluation is an essential component of the process. The information it provides supports the subsequent development and implementation cycles and brings new questions into focus. Both phases of this project experienced difficulties with two overlapping concerns: participation and data gathering. Actual student participation in the lessons, which cannot be documented due to the lack of computer tracking, is not clearly reflected in the data collected. In addition to using the computer logs now available in Libra, enhancements of class integration techniques, improved lab attendant oversight, and increased access to videodisc stations to accommodate student schedules better may result in greater participation and better data in future phases. It may also be, however, that not all learners, particularly those at the first and second year levels, are motivated enough to do multimedia lessons outside of class. Investigating the use of multimedia with more advanced, more motivated students might result in increased participation and more complete data [5].

A fundamental issue revealed in this project is how little is actually known about what learners do with multimedia. The limited number of strategies reported and the number of students who listed no strategies suggest a lack of awareness of how to learn with multimedia. While much work has been done in identifying strategies in communication, research needs to identify those that are appropriate for computer-mediated learning. In addition to computer tracking of students' interactions with computers, researchers need to collect retrospective protocols to gain a better understanding of the strategies used. This approach can be incorporated in future cycles of evaluation through the random selection of a subset of participants to monitor more closely via appointments for the lessons and for follow-up interviews.

Other areas of further research suggested by this study include the effect of multimedia on vocabulary learning and the impact of learning styles and feedback on computer-mediated learning.

As the exploration of multimedia continues, projects such as the one undertaken at CUA will demonstrate the feasibility of creating lessons tailored to the context of an individual department. The process is not a simple one, however, as it involves ongoing cycles of development, implementation, and evaluation. The experience of one project provides important feedback to further this process and is also crucial in developing a knowledge

base in this rapidly expanding field. The generally positive outcomes of this project, both in terms of student learning and student attitude, serve to further motivate continued refinement and use of the lessons at CUA. The questions raised suggest areas for much-needed future research, in particular, the need to understand better how learners make use of resources afforded by the computer in order to manage their own learning. It is through continued cycles of this development-implementation-evaluation process that teachers and students will gain the ability to use the tools that technology provides more knowledgeably and effectively.

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NOTES

1 For information on the Libra authoring system, contact Dr. Robert Fischer, Department of Modern Languages, Southwest Texas State University, San Marcos, Texas 78666, or see http://www.libra.swt.edu.

2 An IBM compatible version of Libra is currently being developed.

3 The most recent version of Libra, 1.2.9, has a tracking log.

4 Gilberte Furstenberg, author of the simulation program *A la rencontre de Philippe*, expressed this view in response to my question at the Tech Talk session at the Northeast Conference on the Teaching of Foreign Languages, April, 1997.

5 Judith Liskin-Gasparro offered this consideration at the University of Texas Spanish Second Language Acquisition Symposium, October 1997.

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APPENDIX—QUESTIONNAIRE SPANISH 102

This questionnaire has been developed to solicit your views about the *Destinos* Libra computer lessons you have just completed in order to better understand their effectiveness and how students can best make use of them. Your responses are needed and appreciated. Your name is requested here in order to give you **attendance credit** for Lección 33; your responses themselves will not affect your grade in any way.

Name _____ **Instructor:** _____

YOUR EXPERIENCE USING THE LIBRA COMPUTER PROGRAM
Fill in the information as appropriate:

1. How much time did you spend doing the Libra lessons?

Lesson #	Time spent					
	Did not do this lesson	less than 15 min.	15-30 min.	30-45 min.	45-60 min.	more than 1 hr.
Lec. 22						
Lec. 30						
Lec. 33						

2. In doing the computer lessons, which of the following features did you use? How helpful were they?

Features	never used	some-times	often used	not helpful	helpful	very helpful	no opinion
Directions and sample questions in English							
Text map with synopsis							
On the video palette:							
play							
fast forward							
rewind							
pause/stop							
Script (not available in Lesson 30)							
Glossary (not available in Lesson 30)							
Feedback button							
Grammar exercises							

Please comment on your experiences using any of the above features:

3. How useful were the computer lessons in helping you develop skills in the following areas? In the last column, number them 1 to 5 to rank the areas according to which ones were most improved for you by doing the

computer lessons, with **1** being the **least** improvement up to **5** for the **greatest** improvement.

Skills	not useful	somewhat useful	very useful	no opinion	RANK 1-5
listening comprehension					
vocabulary learning					
cultural understanding					
situational language use					
grammar usage					

DO YOU AGREE OR DISAGREE?
For the following statements, indicate your view by circling **5** for **Strongly Agree**, **4** for **Agree**, **3** for **Neutral**, **2** for **Disagree**, and **1** for **Strongly Disagree**. Please clarify your response in the far right hand margin as needed.

Statement	SA	A	N	D	SD	Comments
1. I am generally comfortable working on computers.	5	4	3	2	1	
2. I had sufficient orientation to the Libra program before doing the Libra lessons on my own.	5	4	3	2	1	
3. I cannot follow the *Destinos* storyline just by watching the segments in the Libra lesson.	5	4	3	2	1	
4. The computer lessons are sufficiently reinforced in class activities.	5	4	3	2	1	
5. I often feel frustrated while doing the lesson.	5	4	3	2	1	
6. At the beginning of this semester, my attitude toward using computers to learn a foreign language was positive.	5	4	3	2	1	
7. After completing the Libra computer lessons, my attitude about using computers to learn a foreign language is positive.	5	4	3	2	1	
8. The directions and questions in Spanish are clear so I know what I need to do to answer.	5	4	3	2	1	
9. It is difficult to "navigate" from one part of the lesson to another.	5	4	3	2	1	
10. It is easy to quit the Libra lesson and open the grammar.	5	4	3	2	1	
11. Doing the computer lessons helps me do better on the tests.	5	4	3	2	1	
12. The lab attendants (work study students) are helpful to	5	4	3	2	1	

me when I use the Libra computer program.

13. It is easier to do dictations in class/on exams after completing the Libra lesson.	5	4	3	2	1
14. I would like to do more Libra computer lessons.	5	4	3	2	1

YOUR IDEAS, PLEASE

1. What was the main benefit you derived from doing the Libra computer lessons?

   What strategies did <u>you</u> use to maximize this benefit?

2. For Lesson 30, you saw the complete video in lab <u>and</u> you did the Libra lesson in the MLC. How would you compare these two experiences? Explain the advantages and disadvantages of each.

3. What did you like the most about doing the Libra computer lessons?

4. If you could improve one aspect of the Libra computer lesson, what would it be?

5. There are approximately 17 *Destinos* episodes per semester. In your opinion, what would be the ideal number of Libra computer lessons to do? How much time would you be willing to spend on each? Please explain.